OPERATION & MAINTENANCE

HANDBOOK

MODEL P905

PLUG-IN OUTPUT UNIT

DATAPULSE

DIVISION OF DATAPULSE INCORPORATED

MP MASTER

MA28918

OPERATION & MAINTENANCE

HANDBOOK

MODEL P905

PLUG-IN OUTPUT UNIT

Part Number 37000-183

DATAPULSE
A SUBSIDIARY OF SYSTRON – DONNER CORP.
10150 W. JEFFERSON BLVD., CULVER CITY, CALIF.

Digitized by the Internet Archive
in 2025

https://archive.org/details/manualsplus_06941

P905 PLUG-IN OUTPUT UNIT

The P905 Plug-in Output Unit is designed for use with DATAPULSE Model 200M, 103M, and 202M test instruments. The P905 features high power output pulses with independently variable, linear leading and trailing edge transition times, and pulse width variation from less than 50 nanosec. to 500 microsec.

This manual provides detailed instructions for the use and maintenance of your Model P905. A thorough understanding of its contents will contribute to full utilization and longer life of this unit.

TABLE OF CONTENTS

		PAGE
SECTION I	**SPECIFICATIONS**	
	1.1 INPUT TRIGGER	1.1
	1.2 OUTPUT PULSES	1.1
	1.3 POWER REQUIRED	1.1
	1.4 CONSTRUCTION	1.1
	1.5 ACCESSORIES	1.1
SECTION II	**OPERATING INSTRUCTIONS**	
	2.1 DESCRIPTION OF CONTROLS AND CONNECTORS	2.1
	2.2 PLACING IN OPERATION	2.1
	2.3 OPERATING CONSIDERATIONS AND SPECIAL APPLICATIONS	2.2
SECTION III	**THEORY OF OPERATION**	
	3.1 BLOCK DIAGRAM DESCRIPTION	3.1
	3.2 CIRCUIT DESCRIPTIONS	3.1
SECTION IV	**MAINTENANCE INSTRUCTIONS**	
	4.1 PREVENTIVE MAINTENANCE	4.1
	4.2 TROUBLESHOOTING PROCEDURE	4.1
	4.3 CALIBRATION PROCEDURE	4.1
	4.4 SPECIFICATION VERIFICATION	4.3
	ADDENDA AND ERRATA	
	SCHEMATIC DRAWING J40000-051	
	WARRANTY	

SECTION I

SPECIFICATIONS

1.1 INPUT TRIGGER (as provided by standard Models 103M, 202M, 200M*).

Negative 5 volt pulse, ac coupled, with a source impedance of less than 100 ohms; 10 nanoseconds rise time; 20 nanoseconds width; max. prf of 5 mc/s.

1.2 OUTPUT PULSES

Positive or negative provided, selectable by polarity switch, dc coupled with baseline at ground. Precaution must be taken when loading to other than ground, so as not to exceed the breakdown ratings of the output transistors.

1.2.1 Pulse Delay

Leading edge of the pulse output is delayed from the input trigger by approximately 50 nanoseconds (under minimum rise and fall time conditions).

1.2.2 Pulse Duration

Output pulse continuously variable from less than 50 nanoseconds to 500 microseconds in four decade ranges with vernier fill-in.

1.2.3 Amplitude

Continuously variable in two ranges from less than one volt to 30 volts when loaded with 50 ohms.

NOTE

1.2.4.1 Rise Time (with 50 ohm load) - Less than 20 nanosecond variable to 1 μsec, covered in two decade ranges controlling rise and fall simultaneously plus separate fill-in control within each range for rise and fall times.

1.2.4.2 Fall Time (with 50 ohm load) - Variable from typically 25 nsec (30 nsec max.) to 1 μsec.

For use with Type P905 Plug-in, Model 103M serials below 238, 200M serials below 052, and 202M serials below 047 require minor modification per Service Bulletin 200-1.

1.2.5 Waveform Aberrations (with properly connected 50 ohm load).

Overshoot, undershoot, ring and top slope are less than 5%(typically less than 2%) at amplitudes greater than 3 volts.

1.2.6 Duty Cycle

Circuitry limits pulse width duty cycle to 50%. Main instrument power supply limits useable duty cycle to 30% per plug-in if two plug-ins are used. No damage to plug-in or instrument will result if excessive duty cycles are set.

1.2.7 Output Protection

At duty cycles less than 20%, the unit will not be damaged by indefinite shorts to ground. With duty cycles greater than 20%, prolonged shorts to ground should be avoided. Back voltages up to 25 volts may be tolerated from other 50 ohm pulse sources, including direct mixing of output of two plug-ins.

1.3 POWER REQUIRED

46 volts dc at 700 ma for 50% duty cycle, 600 ma for 30% duty cycle. All power required is available from standard Datapulse instruments having the suffix M and using standard plug-in output units. (1.2 amps max. for two output units.)

1.4 CONSTRUCTION

Laminated front panel with black and red markings. Plugs into space provided in standard Datapulse instruments , mating with 24 contact Blue Ribbon connector. Front panel output connectors are BNC type. Size is 4 3/8" H x 4 3/4" W x 8 1/2" D. Weight is approximately 3 1/2 lbs.

1.5 ACCESSORIES

Furnished with one operation and maintenance manual section for insertion in basic instrument manual. Other accessories available at additional cost include extra manuals, coaxial cables, connector adapters, and Type 2002A, 15 watt, 50 ohm load.

OPERATING INSTRUCTIONS

2.1 DESCRIPTION OF CONTROLS AND CONNECTORS

2.1.1 Pulse Duration - μsec, Vernier

The black outer knob selects the width range. There are five ranges, each covering one decade. The red inner knob provides continuous fill-in between ranges of the control. With this control fully counter-clockwise the instrument is calibrated at the width shown by the pulse width control.

2.1.2 Transition Time

2.1.2.1 Range: This control determines the range of the output pulse transition times. There are two ranges each covering approximately one decade.

2.1.2.2 Leading Edge: This control provides continuous variation of the leading edge transition time within the limits set by the transition time range control.

2.1.2.3 Trailing Edge: This control provides continuous variation of the trailing edge transition time within the limits set by the transition time range control.

2.1.3 Output

2.1.3.1 Amplitude: The potentiometric control acts as a vernier between the limits as set on the 3v-10v, 10v-30v switch.

2.1.3.2 Polarity: Positioning of this switch allows the output pulse to be either positive or negative.

2.1.3.3 Output 50 ohms: This BNC connector couples the variable parameter pulse to an external load.

CAUTION

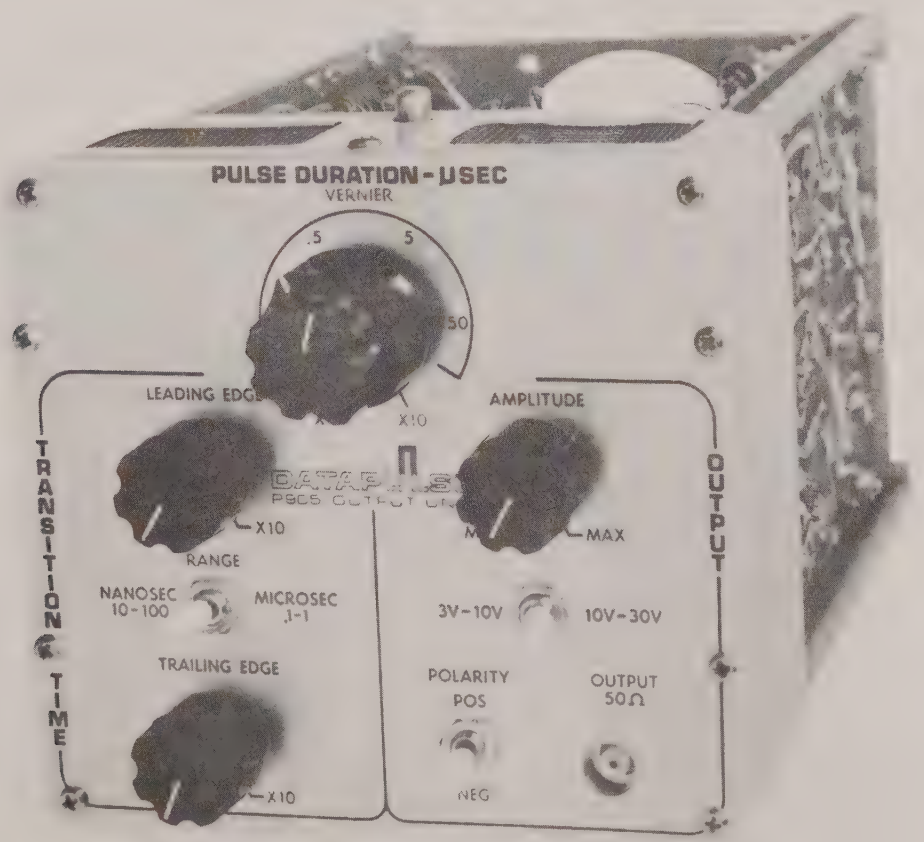
The high frequency transistors used for output amplifiers in this unit are limited as to maximum power dissipation.

High duty cycle operation accompanied by low resistive loads on the output may permanently damage the instrument (See paragraph 1.2.6).

2.2 PLACING IN OPERATION

Plug the P905 into its parent unit, pressing firmly to insure that the connectors make proper contact. Tighten the locking mechanisms. Connect the power cord to the rear of the instrument and to the power line and turn the unit POWER switch on.

Make sure the spacing of the input triggers to the P905 is not less than approximately five times the PULSE DURATION.



Observe the output pulse and vary the controls, observing their operation as explained in Paragraph 2.1.

If the P905 seems to be operating improperly, the troubleshooting section of this manual will be of considerable help in locating the trouble.

2.3 OPERATING CONSIDERATIONS AND SPECIAL APPLICATIONS

2.3.1 Mixing

When mixing the P905 output with other 50 ohm pulse sources, one should take care not to apply a back voltage of more than 25 volts. Low impedance voltage sources other than approximately ground should be avoided.

2.3.2 Transition Time Control

The P905 features an extremely versatile rise and decay time control. The leading and trailing edge transition times of the output pulse may be independently varied over a range of greater than 10:1. In addition, both edges are approximately linear. This feature virtually eliminates errors which usually creep in during setting up of rise and decay for a particular test, insuring repeatability of results and consistent data from test to test.

The transition time range control varies both the rise and decay times simultaneously in two steps from approximately 15 nsec to more than 1 μsec. The leading edge and trailing edge transition times are independent and provide continuous fill-in within a transition time range. With this form of control it is possible to produce waveforms with leading edge transition time differing from trailing edge transition time by a ratio of greater than 10:1, enabling the P905 to generate useful functions such as ramps, sawteeth, triangles and trapezoids, where required.

2.3.3 Loading Considerations

One of the major advantages of the P905 is its clean waveforms, even at minimum rise times. In order to preserve this degree of pulse fidelity, it is imperative that due consideration is given to loading. The generation of a clean waveform with rise times which are variable between the limits of 15 nsec and 1 μsec requires extremely refined circuit design and packaging technique. As such, it is necessary to restrict the type of loading which can be imposed upon the output pulse. Because of the wide usage of 50 ohm coaxial cables and accessories in industry, the P905 was designed for operation with a 50 ohm load.

The output section of the P905 consists of a current amplifier supplying 600 ma. The operating point of the amplifier is set so that the output transistors are near saturation when supplying 600 ma into a 50 ohm load. The load impedance must not vary more than ±5% from 50 ohms if the specified overshoot and undershoot specifications are to be met. Load impedances over 50 ohms cause saturation of the output transistors and hence, introduce storage time effects; on the other hand, load impedances less than 50 ohms increase the collector voltage of the transistors which causes overshoot and ringing. If the output is open circuited, the transistors will be in deep saturation and the resultant waveform will be extremely distorted.

2.3.4 Cabling Considerations

In most cases the P905 will be used to drive loads which are physically separated from it by several feet. In this case, it will be necessary to convey the signal by means of a 50 ohm transmission line. Preservation of low distortion waveforms is largely contingent upon the method of cabling and in proper termination of the transmission line. Clean waveforms are maintained by connecting the generator to its load with 50 ohm coaxial cable, and terminating the cable AT THE LOAD into 50 ohms.

2.3.5 Internal Waveshape Observation

CAUTION

ONE SHOULD NOT ATTEMPT TO VIEW INTERNAL WAVEFORMS EXCEPT WHEN THE POLARITY SWITCH IS IN THE NEG POSITION, AND UNDER NO CIRCUMSTANCES SHOULD AN OSCILLOSCOPE OR OTHER REFERENCE GROUND BE MADE TO THE INTERNAL CIRCUIT SIGNAL GROUND.

SECTION III

THEORY OF OPERATION

3.1 BLOCK DIAGRAM DESCRIPTION

An externally generated trigger is fed to the pulse width circuit via a pulse transformer. The width gate produced by the pulse width multivibrator is shaped into a variable rise and decay pulse by the transition time control circuit. This pulse is buffered and transformed into a current pulse by the output amplifier and is attenuated to the desired level by a constant impedance attenuator.

A positive output pulse is obtained essentially by grounding the output pulse and observing the signal ground as the output pulse. This technique involves the entire circuitry of the P905 back to the input pulse transformer.

CAUTION

When observing internal waveshapes, the polarity switch must be on NEG.

3.2 CIRCUIT DESCRIPTIONS

3.2.1 Pulse Duration Multivibrator

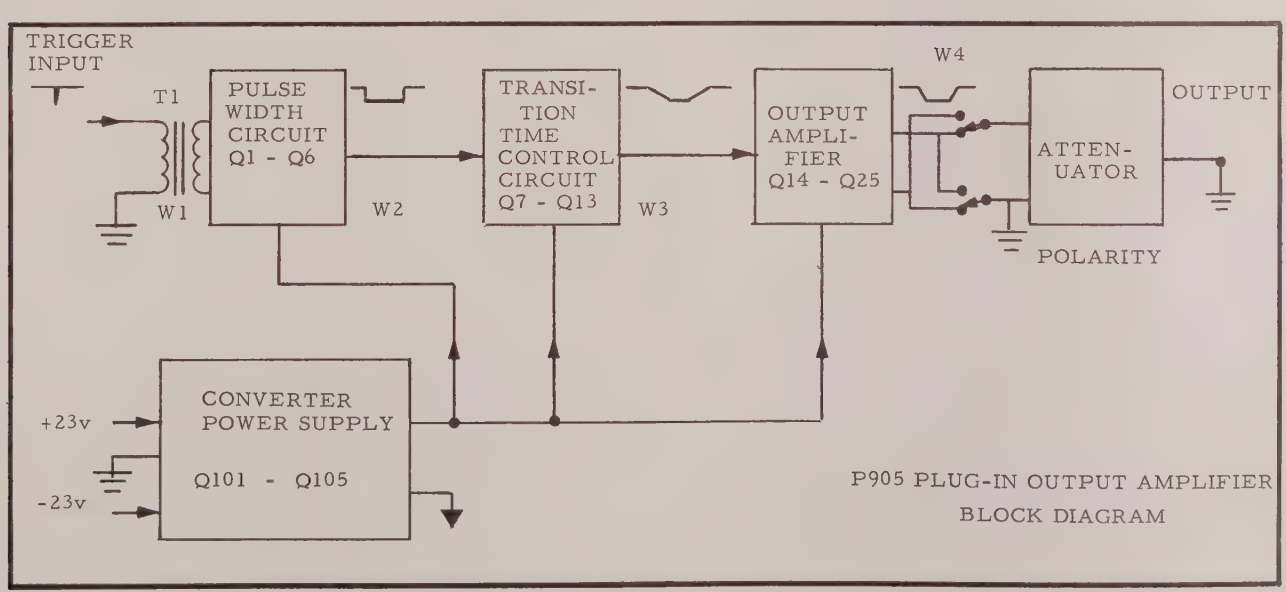
In the static state Q1 is held on by the bias developed across CR4 and CR6. The collector of Q1 is clamped at approx. -14v by CR5. Upon the application of a negative trigger at the base of Q1, it is turned off and its collector rises toward signal ground (▼), but is clamped at -10v by CR7. This positive step is emitter-follower coupled to the timing condenser by Q2, coupled across C_t and through emitter-followers Q3 and Q4 back to the emitter of Q1. C_t now begins to charge through the timing resistors toward -35v. When the voltage at the emitter of Q1 drops below its base voltage, Q1 again begins to conduct. The collector drops to -14v and C_t discharges through CR8 and the emitter resistor of Q2. The output is taken off the base of Q2 and amplified by Q5 and Q6 for presentation to the rise and fall time control circuit.

3.2.2 Transition Time Control Circuit

Transition time control is accomplished through controlled charge and discharge of known values of circuit capacity.

There are two sets of paraphase amplifiers, namely Q7, Q8 and Q9, Q10. In the set Q7, Q8 the base of Q7 is biased more positive than -13v by the input signal, while the base of Q8 is biased at approximately -14v by the drop across CR11. This causes Q7 to be cut off and Q8 to conduct. The signal at the collector of Q8 is clamped at approximately -15v by CR14. In the set composed of Q9 and Q10, the base of Q9 is biased at approximately -17v and the base of Q10 at approximately -18v. This biasing causes Q9 to conduct and Q10 to be cut off.

The negative pulse width gate is applied simultaneously to the base of Q7 and Q9 causing Q7 to conduct and Q9 to turn off. As Q7 turns on, Q8 turns off and as Q9 turns off, Q10 turns on. With Q10 on, the capacitor at its collector (C_t) begins to charge through Q10 and its emitter resistor. The current through Q10 is constant and determined by its emitter resistor, causing C_t to charge in a linear manner. The portion of the signal approximately below -21v will not pass through Q12 due to the emitter cut off action (this acts as the lower level clamp). At the end of pulse time the negative gate subsides allowing Q10 to turn off and Q8 to turn on. C_t now discharges through Q8 and its emitter resistor in a linear manner as previously described. The output is buffered and applied to the output amplifier for further amplification and application to the output connector.



P905 PLUG-IN OUTPUT AMPLIFIER BLOCK DIAGRAM

SECTION IV

MAINTENANCE INSTRUCTIONS

4.1 PREVENTIVE MAINTENANCE

4.1.1 Recalibration

The P905 contains stable circuitry and the unit will provide many hours of trouble free operation. To insure continued reliability, the power supply voltages and pulse width circuitry should be checked for calibration after each 500 hours of operation, or at least every six months if the unit is used intermittently.

4.1.2 Visual Inspection

Conduct visual inspections at regular intervals, preferably every few months. Check for possible circuit defects including loose or broken connections; scorched printed circuit boards, wires, or resistors; and loose nuts and bolts.

4.1.3 Component Replacement and Soldering Connections

When replacing transistors, diodes, or other heat-sensitive devices, a heat sink should be used between the device and the soldering iron tip. A pair of long-nosed pliers may be used in most cases. Special care must be taken, when soldering printed circuit wiring to avoid overheating and subsequent separation of the printed circuit from its epoxy material.

4.2 TROUBLESHOOTING PROCEDURE

The first points to check after most malfunctions are the power supply voltages.

The voltages used in the P905 must be adjusted in the following manner:

a) adjust the +23v and -23v supplies in the parent unit.

b) check for -40v and adjust the -35v supply (for convenience the output polarity switch should be set to NEG, this causes signal and chassis grounds to be the same dc potential).

c) adjust -15v so that it is 5v more negative than -10v (due to component tolerancing -10v may be anywhere between -9.8v and -12.2v).

d) check for -20v, ±5%.

Once it has been ascertained that the power supplies are functioning correctly, the most straightforward method of tracking down a trouble is to start at test point #1 and proceed through the instrument comparing the waveforms to those shown in Figure 4-1. (Set the polarity switch to NEG when observing these waveforms). Refer to Section III for circuit descriptions.

4.3 CALIBRATION PROCEDURE

4.3.1 General

Allow five minutes warm-up before commencing calibration. During this period, make sure that the instrument is working properly. If any portion of the module fails to calibrate, repair should be effected before attempting to complete calibration.

4.3.2 Equipment Required

a) a dc voltmeter with an accuracy of 3% from 10v to 50v, 20,000 ohms/v sensitivity.

b) a general purpose dc oscilloscope with at least 30 mc band-pass.

4.3.3 Power Supply

a) check for proper adjustment of +23v and -23v supplies in the parent unit with which the P905 is used.

b) set the output polarity switch to NEG and use the chassis ground as a reference. Observe the potential between the -35v test point and ground; adjust to -35v with the -35v adj potentiometer.

c) measure the -10v potential and adjust the -15v supply with the -15v adj potentiometer so it is 5v more negative than the -10v supply.

4.3.4 Waveshape Calibration (Output Pulse)

a) Observe the negative output pulse (properly terminated).

Settings:
PULSE DURATION--.05 µsec, Vern. cw
TRANSITION TIME--Leading edge, ccw; Trailing edge, cw; Range, 20-100 nsec
AMPLITUDE-- cw, 10-30v; Scope Settings, 10v/cm, .1 µsec/cm

b) Adjust the waveshape calibration control (abbreviated WS on pc board) until the notch at the beginning of the trailing edge of the pulse is minimum with no leading edge pulse overshoot (see Fig. 4.2). If the pulse amplitude is other than 30v, adjustment of the AMP CAL control should be made. If amplitude is below spec, the WS control must be backed off to allow for an increase in amplitude, then readjusted for waveshape.

4.3.5 Pulse Duration--µsec (set the output pulse polarity to POS)

On the pulse duration switch there are three potentiometer controls labeled .5 µsec Lower Limit, .5 µsec Upper Limit, and .05 µsec Lower Limit.

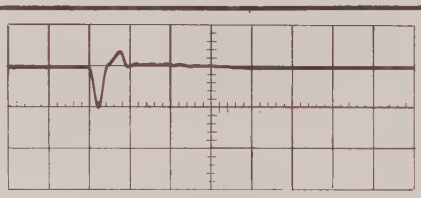
4.3.5 (cont'd.)

Set rise and fall times at minimum. Set delay to minimum. Maintain repetition rate to within nominal duty cycle limitations. Monitor Positive pulse on Tektronix 541 (equivalent items may be used).

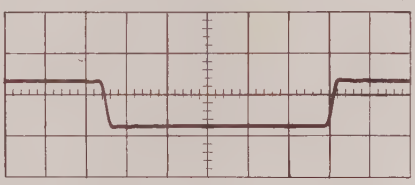
Set pulse duration control to 50 μsec range (vernier fully cw). Adjust 0.5 Upper Limit Potentiometer to 0.5 Msec. Set pulse duration control to 0.05 μsec range (vernier fully ccw). Adjust 0.05 Lower Limit Potentiometer to 50 nsec. (Use Sampling Scope) Set vernier at this range fully cw. Adjust C-10 trimmer to 0.55 μsec. (Readjustment of 0.05 Lower Limit Potentiometer may be necessary. Set pulse duration control to 0.5 μsec position (Vernier fully ccw). Adjust 0.5 Lower Limit Potentiometer to 0.45 μsec.

Approximately 20% overlap should be seen with these settings. Readjustments may also be necessary when plug-in adaptor is removed from extender and mounted directly to unit.

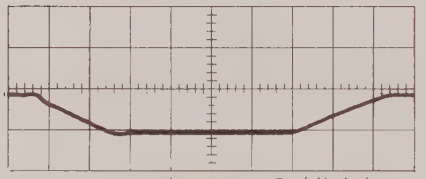
This concludes the P905 calibration.



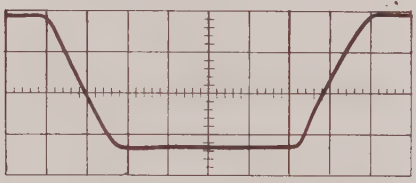
W1: .1μsec/division, 5v/division



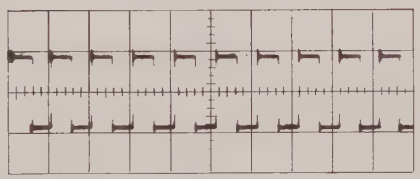
W2: .1μsec/division, 5v/division



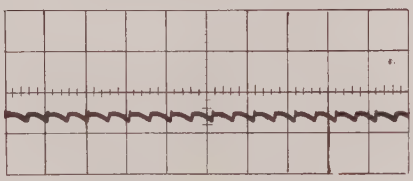
W3: .1μsec/division, 5v/division



W4: .1μsec/division, 10v/division

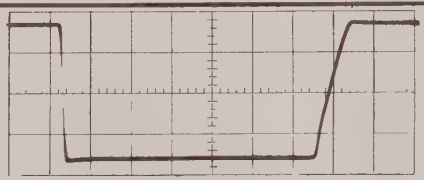


W5: 50v/cm, 1 millisec/cm

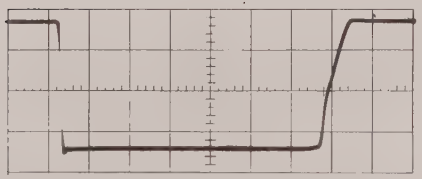


W6: 0.5v/cm, 1 millisec/cm

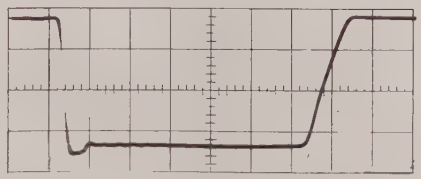
FIGURE 4-1: The following settings were used to obtain Waveforms W1 through W6: Pulse Duration: .05μsec range, vernier X10. Transition Time: 20--100 nsec range, leading & trailing edge X10. Amplitude: 10--30v range, amplitude max. Polarity: Neg. with output pulse properly terminated.



CORRECTLY CALIBRATED
.1 μsec/division, 10v/division



OUTPUT TOO FAR INTO SATURATION
(Trailing Edge Notch Apparent)
.1μsec/division, 10v/division



OUTPUT NOT NEAR ENOUGH TO SATURATION
(too much overshoot & ringing)
.1μsec/division, 10v/division

FIG. 4.2 WAVESHAPE CALIBRATION

4.4 SPECIFICATION VERIFICATION

The following equipment or its equivalent is necessary:

a) A 5 mc trigger source with ±23v at the required currents (Datapulse Model 202M or 103M.) Datapulse Model 200M is not capable of testing the 5mc operation, but may be used with this limitation in mind.

b) Syncroscope (Tektronix type 543 with type L single trace preamplifier).

c) Sampling Scope (Tektronix Type 661)

IT IS ASSUMED THAT THE INSTRUMENT WITH WHICH THE P905 IS BEING USED FULLY MEETS THE REQUIRED SPECIFICATIONS AS TO POWER SUPPLY VOLTAGES AND TRIGGER INPUT WAVESHAPE.

4.4.1 Pulse Duration

Plug the P905 into one of the receptacles provided in its parent unit.

Set CLOCK (REPETITION) RATE to 0.1 MC/S, VERNIER cw.

Throw all program switches (200 or 202) to the up position.

Set PULSE DELAY to minimum (on parent unit).

Set PULSE DURATION to .05 μsec and Vernier ccw.

Set other P905 controls as follows:

CONTROL	SETTING
LEADING EDGE	Fully ccw (X1)
RANGE	20-100 nsec
TRAILING EDGE	Fully ccw (X1)
AMPLITUDE	Fully cw(MAX)
3V-10V, 10V-30V	10V-30V
POLARITY	NEG

Load the output with 50 ohms (See sect. 2.3.3 for loading considerations).

Turn the instrument on and allow 5 minutes warm-up period.

Set scope sweep speed to .1 μsec/cm, vertical sensitivity 10v/cm.

Sync scope from Clock (Reference) sync output.

View the pulse output.

See pulse duration settings Table 4-1.

4.4.2 Pulse Amplitude

With instrument and scope settings as in the final step of the Pulse Duration Calibration Check, verify a pulse amplitude of at least 30 volts. Throw the 3v-10v, 10v-30v switch to 3v-10v. Verify a pulse amplitude of approx 10v (±1v). Verify that the pulse amplitude decreases to less than one volt when the AMPLITUDE control is rotated fully CCW.

4.4.3 Leading and Trailing Edge Transition Times And Pulse Fidelity Check

Set Scope Sweep speed to .1 μsec/cm.

Set Pulse Duration to .5 μsec X1.

Set Repetition Rate to 10 KC/sec.

Set Transition Time Range Switch to 20-100 nsec.

Set Leading Edge and Trailing Edge Controls fully CW (X10).

Verify rise and decay times of pulses to be greater than .1 μsec.

Set Scope Sweep speed to 1 μsec/cm.

Set Pulse Duration to 5 μsec X10.

Set Transition Time Range switch to .1-1 μsec.

Verify rise and decay times of pulse to be greater than 1 μsec.

Set Leading Edge and Trailing Edge Controls fully CCW (X1).

Set Pulse Duration to .5 μsec X1.

Set Scope Sweep Speed to .1 μsec/cm.

Verify that the rise and decay times are less than they were when the controls were set on 20-100 nsec and X10 above.

Observe Pulse on Sampling Scope .

Set Sweep speed to 50 nsec/cm.

TABLE 4-1

PULSE DURATION CALIBRATION CHECK

Clock Rate (Rep. Rate)	Pulse Duration	Vernier	Scope Sweep Speed(per CM)	Correct Pulse Duration[1](CM)	Tolerance (CM)
.1 mc/s	.05μsec	CCW	.02μs (.1, mag X5)	2.5 or less	±.5
.1 mc/s	.05 μsec	CW	.1 μsec	5	±.5
10 kc/s	.5 μsec	CCW	.1 μsec	5	±.5
10 kc/s	.5 μsec	CW	1.0 μsec	5	±.5
1 kc/s	5 μsec	CCW	1.0 μsec	5	±.5
1 kc/s	5 μsec	CW	10 μsec	5	±.5
.1 kc/s	50 μsec	CCW	10 μsec	5	±.5
.1 kc/s	50 μsec	CW	.1 millisec	5	±.5

1. Pulse duration is measured from the 50% amplitude point on the leading edge of the pulse to the 50% amplitude point on the trailing edge of the pulse.

4.4.3 (Con'd)

Set Transition Time Range Switch on 20-100 nsec.

Set Leading & Trailing Edge Controls CCW (X1).

Set Pulse Duration Switch on .05 μsec and adjust vernier control for a 5 cm wide pulse.

Using an appropriate multiplier on scope sweep speed, verify that the leading edge transition time is less than 20 nsec and that the trailing edge transition time is less than 30 nsec.

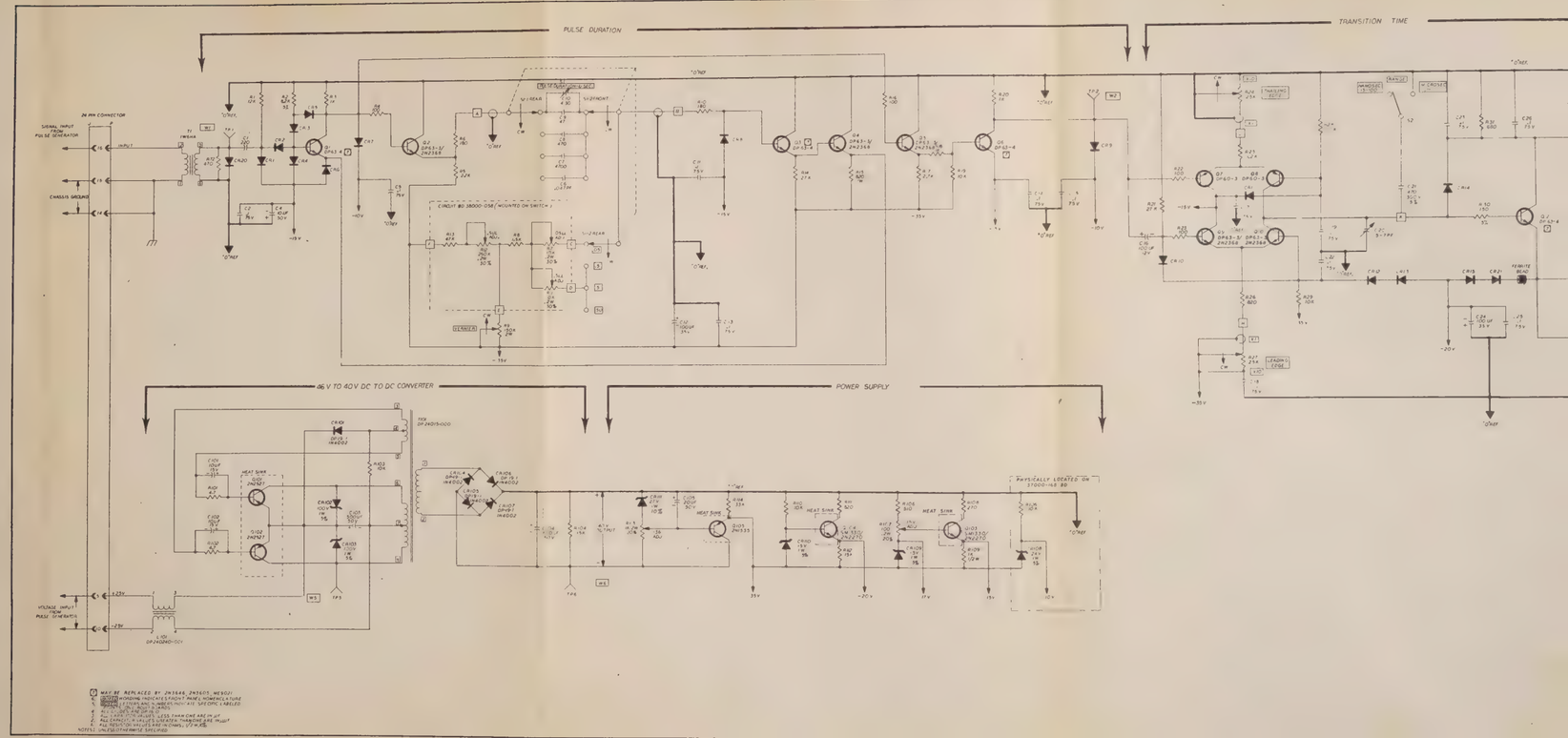
Switch Pulse Polarity to POS.

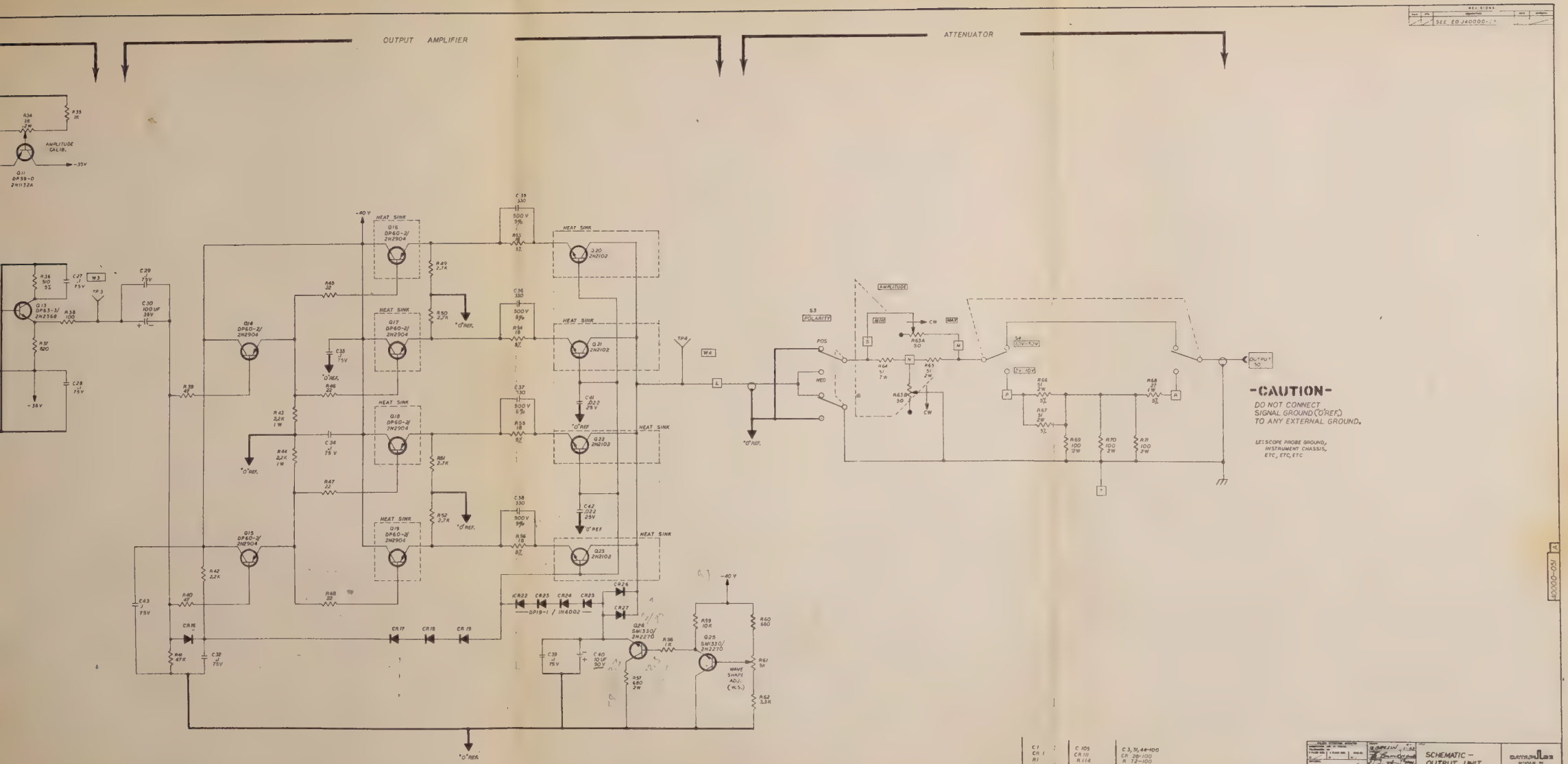
Verify pulse aberrations being less than ±5% of total pulse amplitude.

Switch Pulse Polarity to NEG.

Verify pulse aberrations being less than ±5% of total pulse amplitude.

This concludes the Specification Verification Check.


PULSE DURATION
TRANSITION TIME
46 V TO 40 V DC TO DC CONVERTER
POWER SUPPLY
24 PIN CONNECTOR
SIGNAL INPUT FROM PULSE GENERATOR
CHASSIS GROUND
VOLTAGE INPUT FROM PULSE GENERATOR
LEADING EDGE
TRAILING EDGE
PHYSICALLY LOCATED ON 37000-16 BD
MAY BE REPLACED BY: 2N3646, 2N3605, MES921
NOTES: UNLESS OTHERWISE SPECIFIED


OUTPUT AMPLIFIER
ATTENUATOR
AMPLITUDE CALIB.
Q11 DP39-0 2N1132A
R34 1K 2W
R35 1K
-35V
Q13 DP63-3/ 2N2568
R36 510 5%
C27 .1 75V
W3
TP3
R38 100
R37 620
C28 .1 75V
-36V
C29 .1 75V
C30 100 UF 38V
-40 V
HEAT SINK
Q16 DP60-2/ 2N2904
Q17 DP60-2/ 2N2904
Q18 DP60-2/ 2N2904
Q19 DP60-2/ 2N2904
Q14 DP60-2/ 2N2904
Q15 DP60-2/ 2N2904
R39 4K
R43 2.2K 1W
R44 2.2K 1W
R42 2.2K
R40 4K
R48 22
R46 22
R47 22
R45 22
R49 2.7K
R50 2.7K
R51 2.7K
R52 2.7K
C35 .1 75V
C34 .1 75V
C36 330 500V 5%
C37 330 500V 5%
C38 330 500V 5%
R53 18 5%
R54 18 5%
R55 18 5%
R56 18 5%
Q20 2N2102
Q21 2N2102
Q22 2N2102
Q23 2N2102
C41 .022 25V
C42 .022 25V
"0" REF.
CR22 CR23 CR24 CR25
DP19-1 / IN4002
CR26
CR27
CR16
CR17
CR18
CR19
R41 47K
C32 .1 75V
C43 .1 75V
C39 .1 75V
C40 10 UF 50V
Q26 SMI330/ 2N2270
Q25 SMI330/ 2N2270
R58 1R
R57 680 2W
R59 10K
R60 680
R61 5K
WAVE SHAPE ADJ. (W.S.)
R62 3.3K
TP4
W4
S3 POLARITY
POS
NEG
AMPLITUDE
MIN
MAX
CW
R63A 50
R63B 50
R64 5K 7W
R65 5K 2W
R66 5K 2W 5%
R67 5K 2W 5%
R68 47 1W 5%
R69 100 2W
R70 100 2W
R71 100 2W
OUTPUT 50
-CAUTION-
DO NOT CONNECT SIGNAL GROUND ("0" REF.) TO ANY EXTERNAL GROUND.
LE: SCOPE PROBE GROUND, INSTRUMENT CHASSIS, ETC, ETC, ETC
SEE EO J40000-
C1 C 105
CR1 CR 111
R1 R 114
Q1 Q 105
C 3, 31, 46-100
CR 29-100
R 12-100
Q 25 - 100
FIRST USED
LAST USED
OMITTED
REFERENCE DESIGNATIONS
SCHEMATIC – OUTPUT UNIT P 905
EATON-LEE
40000-051

ADDENDA AND ERRATA

E. O. NO.	EFFECTIVE DATE	DWG. NO.	CHANGE
845	2-17-66	J40000-051A	Schematic - Power Supply Section Change R107 to read 250Ω, 2w (-15V Adjust), was 100Ω.
864	3-15-66	J40000-051A	Schematic - Output Unit Change Q7 and Q8 from DP60-3 to DP60-6.
2088 A	8-25-66	J40000-051A	Schematic - Output Unit Change R53, 54, 55 and 56. 18Ω, 1/2w, 5%, Resistors,P/N 10011-180 to 13Ω, 1/2w, 5%, P/N 10011-130.
2094	9-3-66	Tech. Bull. P905 Manual Section I, Para 1.2.2, 1.2.3, Para. 1.2.4.2 D50000-128	Specification Change: 1. Second line from top, right-hand side: Change ±30Vto ±25V. 2. Pulse Duration - Add the following at the end of paragraph: "Jitter is less than 0.5%." 3. Amplitude - Change 30V to 25V. 4. Change 25 nsec (30 nsec max.) to 20 nsec (25 nsec max.)..... Art Work 5. Change 10V-30V to 10V-25V.
2021	8-26-66	Transistor Equiv.	SM 1330, P/N 12685-004 is an acceptable substitute for DP63-6, P/N 22635-006.
2081	8-26-66	Transistor Substitution	2N2102, P/N 12685-005 may be used in lieu of 2N2270, P/N 12695-001.
2099	9-13-66		Change calibration procedure from -5 volts to -6 volts.
2183 (B)	1-13-67	J40000-051 37000-178	Change C6, .047μF, 200V, P/N 11124-473 to .047μF, 100V, P/N 11123-473. Also C214. Change C6, .047 μF, 200V, P/N 1124-473 to .047 μF, 100V, P/N 1123-473.
2367	11-13-67	SB 1-65	Transistor 2N2369A P/N 22635-003 is an acceptable substitute for DP63-4 P/N 22635-004.

ADDENDA AND ERRATA

E. O. NO.	EFFECTIVE DATE	DWG. NO.	CHANGE
2359	11-18-67	SB 1-65	NPN Transistor Equivalent: RCA 38880 is an acceptable equivalent for RCA 40250.

DATAPULSE
A SUBSIDIARY OF SYSTRON-DONNER CORPORATION

SERVICE BULLETIN
NO. 1-65

SEMICONDUCTOR REPLACEMENTS

(Applicable to all Datapulse Models except the Model 102.)

Datapulse makes extensive use of house labeled semiconductors, superseding or used in place of commercial equivalents. In most cases, these are procured against relaxed or actual commercial equivalent specifications, and commercial equivalents as listed below may, therefore, be used as replacements.

DATAPULSE TYPE NO.	DATAPULSE PART NO.	COMMERCIAL EQUIVALENT
Diodes:		
DP16-0	22164-000	1N3600
DP16-1	22164-001	1N3604
DP16-2	22164-002	HPA1003
DP19-0	22194-000	1N2070
DP19-1	22194-001	1N4002
DP19-6	22194-006	1N2071
Transistors:		
DP43-0	22435-000	2N984
DP46-0	22465-000	2N964A
DP46-1	22465-001	None*
DP59-0	22595-000	2N1132A
DP60-0	22605-000	2N2411
DP60-1	22605-001	None*
DP60-2	22605-002	2N2904 or 2N3133
DP60-3	22605-003	2N2894
DP60-4	22605-004	2N3209
DP60-5	22605-005	ft1702
DP60-6	22605-006	2N3640
DP60-7	12605-007	None*
DP63-0	22635-000	2N2369 or 2N2501
DP63-1	22635-001	2N3723
DP63-2	22635-002	None*
DP63-3	22635-003	2N2369A (Fairchild)
DP63-4	22635-004	2N3646 or MPS3646 or 2N2369A
DP63-6	22635-006	2N2270

*Replacements for the following items should be procured from Datapulse:

DP46-1 is selected from 2N2964A for high Beta.
DP60-1 is selected from 2N2894 for high V ceo.
DP63-2 is selected from 2N914 for tighter Beta tolerance.
DP60-7 is selected from DP60-1 for 25 volt breakdown.

1-10-68

WARRANTY

Datapulse Incorporated warrants each instrument of its manufacture to be free from defects in material and workmanship. Our obligation under this Warranty is limited to servicing or adjusting any instrument returned to our factory for that purpose, and to making good at our factory any part or parts thereof except tubes, transistors, fuses or batteries which shall, within one year after making delivery to the original purchaser, be returned to us with transportation charges prepaid, and which our examination shall disclose to our satisfaction to have been thus defective.

Instruments returned under this Warranty will not be accepted at the Datapulse plant without prior authorization by a Datapulse representative or by the service manager of Datapulse Incorporated.

Datapulse Incorporated reserves the right to make changes in design at any time without incurring any obligation to install same on units previously purchased.

This Warranty is expressly in lieu of all other obligations or liabilities on the part of Datapulse Incorporated and Datapulse Incorporated neither assumes nor authorizes any other person to assume for them any other liability in connection with the sales of Datapulse Incorporated instruments.

MP MASTER
MA28918